

TABLE

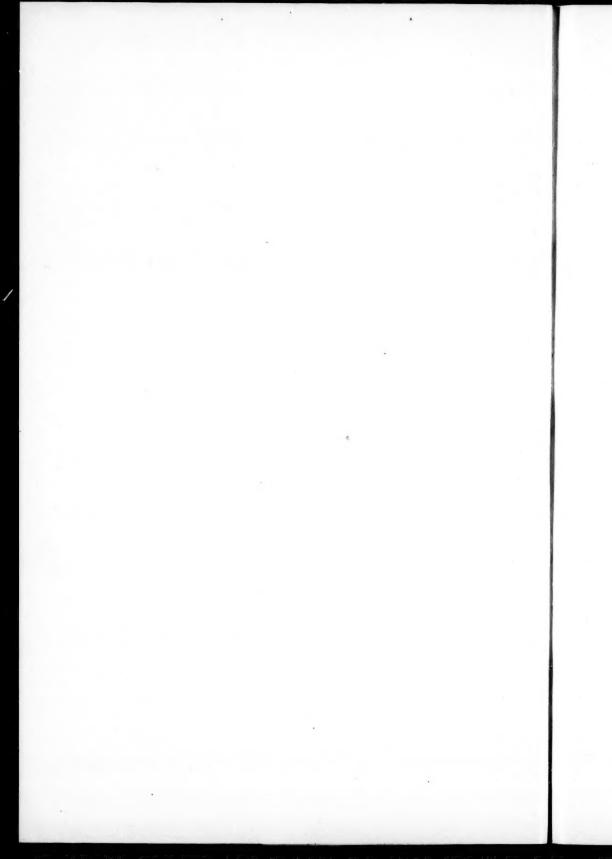
-FOR-

FINDING THE HOUR ANGLE

WITHOUT LOGARITHMS.

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PREFACE.

This Table was prepared for the use of Surveyors in Canada, to enable them to find the Hour Angle from a morning or afternoon altitude of the sun without the use of Logarithms, with sufficient accuracy to determine the Azimuth of Polaris at any time without waiting for an elongation (a Table for which is in preparation).

This Table, however, gives the Hour Angle so close that it is available for Navigators, the error varying from 0 to 4 seconds, the greatest error occurring where the Declination is 0, the Latitude 58 and the Altitude 28° 45'.

It can be used in the Northern or Southern Hemisphere between the Latitudes 40° and 60°.

EXPLANATION OF THE TABLE.

The column headed Alt. contains the altitudes of the sun's centre corrected for Parallax and Refraction.

The column headed H. A. contains the Hour Angle corresponding to the Altitude which is on the same line, and to the Latitude and Declination which is above it.

The column headed D. gives the variation of the Hour Angle for one minute of Altitude.

The Table is computed to the nearest second for every Degree of Declination from 0 to 24 N., for every degree of Latitude from 40 to 59 N., and for every 30 minutes of Altitude within limits of four degrees.

Bessels' Refractions from Altitude 24° to 44° will be found on page

METHOD OF USING THE TABLE.

(1.) On the day of observation the observer shall note the Declination of the sun, and consulting the Table, shall time his observation, so that it shall fall within the limits of the Altitudes for that degree of Declination and those of the one following.

Having taken his Altitude and corrected it for Refraction, Parallax and Semidiameter, he shall take from the Table the Hour Angle due to the next lower Altitude, next lower Latitude and next lower Declination. Multiply the minutes and seconds of the corrected observed Altitude by the number under D, and apply it to the Hour Angle with the sign minus.

Multiply the difference between the Hour Angles due to the two successive degrees of Latitude between which lies the Latitude of the place, by the minutes and seconds in the latter and apply to the Hour Angle with the sign minus. Call the result A.

r

Proceed in the same manner, but using the next higher Declination, and call the result B.

Subtract A from B, multiply the difference by the minutes and seconds of the Declination, add the product to A. The result will be the Hour Angle.

N.B.—The result of each of those multiplications is seconds of time.

The following examples will illustrate the method:

EXAMPLE 1.

Adding to A gives H	lour A	Angl	е.				3	16	11.2	2
B-A=4.31 which multiplied by 23	3.63 g	ives			٠.	====		1	41.9)
			sec		В	-A =		4	18.7	·
27.17 × 1.62 = 44.01	• • • • •	=	= .			44	3	18	48	= B
$18.33 \times 6 = 109.97 \dots$:	= .	-	1	50				
Tabular Hour Angle, Dec. 20				3	21	22				
27.17 × 1.83 = 49.72		••				49.7	3	14	29.	3 = A
$18.33 \times 6 = 109.97 \dots$						50	h.		sec.	
Tabular Hour Angle, Dec. 19°					17					
Tabular Hour Angle Dec 200				h.		sec.				
Dec'n corrected for Lon	19	23	38	44	19	23.63				
Latitude of place	46	27	10	4.6	46	27.17				
Corrected Altitude				or	41	48.33				
	0		11							

EXAMPLE 2.

	0		"	0	1			
Corrected Altitude	39	14	50 or	39	14.83			
Latitude of place	57	12	40 "	57	12.67			
Dec'n corrected for Lon	22	9	20 "	22	9.33			
m 1 1 22			h.	m.	sec.			
Tabular Hour Angle, Dec. 22	• • • •		3	25	32			
$14.83 \times 7.9 = 117.2$					57.2	h.	m.	sec.
$12.67 \times 3 = 38 \dots$		=	=		38.0		22	
				-				
Tabular Hour Angle, Dec. 23 .			3	_	3			
14.83 × 7. 8=115.7	•	=	= -	1	55.7			
$12.67 \times 2.65 = 33.6$., =	=		33.6	3	29	33.7=B
							6	36.9= B-A
$6.62 \times 9.33 = 61.8$								
0.02 ~ 9.33 - 01.0	• • • •	• • • •	• • • • • •		. =	-	I	1.8
Adding to A give		ur A		• • • •	. =	3	23	58.6

(2.) If the minutes of the Observed Altitude when corrected lie between 15 and 30, or between 45 and 60, and the minutes of the Latitude and Declination are each greater than 30, or if any two of those three quantities fulfil these conditions, take out the Hour Angle due to the next higher Declination, Latitude and Altitude. Proceed as in (1) but using the sign plus where minus is mentioned, and subtracting from instead of adding the final result to A.

The following example will illustrate the method:

A

EXAMPLE.

Corrected Altitude	25 56 5	34	40			
Hour Angle, Dec. 6, Lat. 57, Alt. 26 12 40 or 12.7 × 8.8 = 111.8		1	51.8			
_	3	22	21.6=A			
Hour Angle, Dec. 5, Lat. 57, Alt. 26 12.7 × 9 = 114.3			44 54·3			
25.3×4.9=124.0	3		$\frac{4.0}{42.3} = B$			
	7		39·3=A-E 23.8=180.	9=		0.9
Hour Angle	••••	•••			19	20.7

DECLINATION 0

,	40	 41		-	42		4	43		44		4	45		46			47		48	~		64	_		50	
	H.A. D.	H.A.	D.	H.A.		D.	H.A.	D.	H.A.		D.	H.A.	H.A. D.	-	H.A.	D.	H.A.	D.	-	H.A.	D.	H.A.	4	Ö.	H.A.	4	Ö.
3h	s I 6.0	 3h m s 14 2	s 6.1	n 3h	22 8	s 11	3h m s 7 29	6.5	tg a	22 8	s 1	agh s	s s 0 7.0	9 70	2h 5 51	7.2	2h S1 2	1 . 7	s m 2h 7.5 46	2h 6 36	s 7.9	42 E ±	1 s &	s s.2	12 E	- × 4	8.7
	1 6.0	 10 58	6.2	7	42 6	6.4	4 13	9.9	° °	00	8.9	56 3	31 7.0	52	15	7.3	47 3	39 7.	7.6 42		8.0	37		8.4	31		8.8
	1 6.1	 7 52	6.2	4	31 6	6.4	0 56	9.9	57	9	6.9	53 (0 7.1	- 48	35	7.4	43.5	50 7.	7.7 38	3 41	8.1	33	9	8.5	27	0	9.0
• • • •	59 6.1	 4 45	6.3	1 18		6.5	57 37	6.7	53	40 6	6.9	49 27	7 7.2	4	53	7.5	39 5	58 7.	7.8 34	1 39	8.2	28	50	8.7	22	30	9.2
-F7	55 6.1	 1 36	6.3	58	3	6.5	54 16	6.8	50	12 7	7.0	45 51	1.3	14	00	9.2	36	3.	8.0 30	32	8.4	7	30	8.9	17	53	9.4
20	51 6.2	 58 26	6.4	54	47 6.	9.9	50 53	8.9	46	42 7	7.1	42 12	2 7.4	37	20	7.7	32	8.	8.1 26	20	8.5	20	4	9.1	13	10	9.7
4	45 6.3	55 14	6.4	51	29 6.	6.7	47 28	6.9	43	9 7	7.2	38 30	5.7	33	28	8.2	28	1 8.2	2 22	4	8.7	15	33	9.3	00	-61	10.0
(4)	37 6.3	 52 1	6.5	48	9 6	6.7	1 4	6.9	39	34 7.	7.3	34 45	2 7.6	29	33	6-2	23 5	54 8.4	4 17	4	8.9	10	53	9.5	"	30	10.3
(7)	27 6.3	 48 45	6.5	4	47 6.	6.8	40 13	7.0	35	55 7.	7.3	30 57	7.7	25	4	8.0	19 4	41 8.5	5 13	15	9.0	9	7	9.7	58	=	11 10.6

DECLINATION 0

Lat. N.		20		51			55		53			54		55			96		57		0			9
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30	11 48		-		***************************************	55 6	0.00		*	×.5	26	7 9.0		50 10	9.5	43 3	38 10.0	36	26 10.7		28 26 11.5		19 21	26.12.5
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30	56 20		51		-	45 38		4 8	, ,		37 41		30	42 10.3		22 53	53 11.1 14 8 12.1	4	8 12.1		4 12 13.3 I		52 43	43 15.1
0	52 20	8.1	47	47 1 8.5				5	5 :		¥ 3	6.6	22	33 10.6		17 21	21 11.4	00	6 12.5	27	32 14.0		45 11	11 16.1
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DECLINATION 1 N

at. N.	Lat. N. 40	0		41		45	01	43	ಝ		4	_		45		4.	9		4		44 45 46 47	4	43	- 1	43		20
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30 30	30 18 26	6 2.9	15 35	35 6	5.1	12 33	6.3	6.1 12 33 6.3 9 19	.9 61	4	6.4 5 51	9.9	6.6 2 9	6	6.9	58 11	7 11	1	53 56	7.4	7.1 53 56 7.4 49 20	20 ;	7.7 44	44 21	8.0	38	58 8.5
31 0	15 28	8 5.9	5.9 12 33	33 6	. I .	9 25	6.3	6.1 9 25 6.3 6 6 6.5 2 32	6 6.	Ň	2 32	6.7	58	43	6.9	5.	38 7	7	50 14	1 7.5	6.7 58 43 6.9 54 38 7.2 50 14 7.5 45 29	29	7.8	40 20	8.2	34	44 8.6
31 30	12 3	30 6.0		9 29 6.2	5.2	6 17	6.4	6.4 2 51	51 6.	ıν.	2 59 11	8.9	55	15.	7.0	6.5 59 11 6.8 55 15 7.0 51 2 7.3 46 30 7.6	2 7		46 3c	9.2	41, 35		6.2	36 15	5 8.3	30 26	26 8.8
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32 30	30 6 28	1.9 8		3 17 6	6.2	2 59 54	6.4	56 17	17. 6.	7	6.7 52 23	6.9	48	48 13	7.2	43 43	13 7	7.5	38 5	7.8	38 51 7.8 33 35 8.2 27 50 8.7	35 8	8.5	27 50	8.7	21	33 9.2
33 0	33 0 3 26	1.9 9		0 10	6.3	56 41	6.5	52 57	57 6	6.7 : 48	98 84	7.0	7.0 44 38 7.2.	38	7.2.	39	59 7	9.	34 5	7.9	39 59 7.6 34 57 7.9 29 30	30 8	5.3	8.3 23 30	8.8	91	16 58 9.4
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DECLINATION 2 N

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	19			17 5	. 9	6.0	14 11	6.2	11	- 5	5.4	11 5 6.4 7 47 6.6 4 15	2 6.0		4	5 6.8	6.8 0 27	27	7.1	7.1 56	23	23 7.3	51	9.2 65	-	47 15	8.0	45	9	×.
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		I.F	6:	5.9 11 3 6.1 7 59 6.3	9.		7 59	6.3	4	4 42 6.5	5.5	1 12	2 6.7		2 57 27	27 7.0	7.0 53	24	7.2	49 4	4	7.5	44 2	22 7.8		39 17	8.2	33	45	8.6
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DECLINATION 2 N

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Lat. N. 50	H.A	3h o 34 56	31 24	27 50	24 14	20 36	16 56	13 15	9 31	5 44 7.6
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DECLINATION 3 N

×	at, N. 40	Q		7	11	42	01	7	43		44			4		•	46	-	4,	47		20			64			20
ALT.	H.A. D.	D.	H.A.		D.	H.A.	D.	H.A.			D. H.A.	D.	Poster	H.A. D.	D.	H.A	H.A. D.	<u> </u>	H.A.	G.		H.A. D.	D.	H.A.	-	<u>.</u>	H.A.	. D
İ	34	1		3h		3h		3h	-	:	3h			3h		3h			3h	1		3h		(minut)		-		
30 0	E 6	5 5.7	E 7	22	s 5.9	s m s 5.9 24 49	6.0	s m s s m s s m s s m s s m s 6.0 22 7 6.2 19 13 6.3 16 7 6.5 12 48	2 6	.2	n s 19 13	6.3	E 91		s 6.5	12 ,	* 8¢	s m s 6.7 9 15	ш 1 6	5.6.	s m s	28° S	s 7.2	m s	53 2	7.5		27.3
30 30	26 53	3 5.7	24	56	5.9	21 49	6.0	19	2	6.2	16 3	6.4	12	52	9.9	9 26		8.9	5 47		7.0	1 52	7.3	57	38	9.2	53	3
31 0	24 I	5.7	21	30	c.9	18 48		6.1 15 5	55 6	6.2	12 51	6.4	6	5,	9.9	6 3	3 6	6.9	2 17		7.1 58	58 14	7.4	53	51	7.7	49	7
31 30	21	7 5.7	18	31	6.0	15 45	6.1	12	48 6	6.3	9 38	6.5	9	6 17	6.7	2 37		6.9	300	4 7.	7.2 54	54 33	7.4	50	50 I	7.8	45	7
32 0	18 13		5.7 15	33	0.9	12 42	6.2	6.2 9 39	9 6	6.4	6 24 6.5	6.5		2 55	8.9	59 10		7.0	55	9 7.	7.2 50	50	7.5	46	90	6.2	41	3
32 30	15 18	8 5.9	12	45	6.1	6.1 9 35	6.2	9	28 6	6.4	3 9	6.6	59	32	8.9	55 4	41 7	7.0	51 3	33 7.	7.3 47	4	9.2	42	12	8.0	36	26
33 0	12 21	5.9		32	6.1	6 31	6.2	3 18		6.4	59 51	9.9	26	6	6.9	52	101	7.1	47 5	53 7.	7.4 43	3 15	7.7	38	38 13	8.1	32	45
33 30	9 24	4 5.9	9	30	6.1	3 24	6.3	0 5	5	6.5	56 32	6.7	25	43	6.9	48	9	7.2 44 11	4	1 7.	7.5 39	23	6.7	34	10	8.2	28	29
0	34 0 6 26	5. 6.0	6.0 3 26	26	6.2	0 15 63	63	2 56 51	9 11	6.5	53 11 6.7	6.7		49 15	7.0	45	0 7	45 0 7.2 40	40 2	25 7.	7.6 35	5 27	8.0	30	3	8.3	42	90

DECLINATION 3 N

	00		21		5.5		30	53		54		55		.0	56		55	30	20	50	-
	H.A. D.		H.A. D.	1	H.A.	D.	H.A.	D.	H.A.	. D.		II.A. 1	D	1.7.	H.A. D.	H.		Ξ	Ö	H A	
	6.9	3h 3h 5 m 8 8 24 0 40 40 6.9 37 30 7.2	s 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	3h s s m 2 34 6 7.4 39	e »	s 7.4	3h m s 30 27	7.7	3h 3h 3h 3h 3h 3h 3h 3	× × 0	m 3	h 15 8	- s	3h s	s 8.7	3h	3h 3h 3h 17 38 87 12 27 01		, v ,	3h s	s s
C)	7.0	30 37 12 7.0 33 55	7	30	30 23	7.5	7.5 26 36	7.8	7.8 22 31 8.1 18 6 8.4 13 18 8.8 8 5 9.2	1 8.1	18	9	. 4.	3 18	8.8	∞	2 6	2 22	0.7	2 9 1	0.1
1000	7.1	25 0 33 41 7.1 30 18	8 7.3	7.3 26 39	39	9.2	22 43	7.8	22 43 7.8 18 29 8.2	9 8.2	13	13 53 8	ż	8 54	8.9	8.5 8 54 8.9 3 28	8 9.4			50 57 1	5.010
6	30 9 7.1	7.1 26 3	39 7.4	. 22	52	9.2	7.4 22 52 7.6 18 48	7.9	7.9 14 24 8.2	8.2	6	9 38 8.	8.6	4 27	0.6	58 47	9.8	2 2		30 37 10.3	<u> </u>
36	7.2	22	58 7.4		19 4	7.7	14 51	8.0	7.7 14 51 8.0 10 17 8.4	8.4		5 20 8		2 59 56	9.3	. 2	54 2 0.7	17 54		5 5	7.0
23 1	7.2	19 15	5 7.5		15 13	7.8	10 50	8.1	8.1 6 6 8.5	8.5		0.58 8.		55 21	6.3		· · · ·	? ?	5.5	0 1	0.1
27 0 19 24	7.3	15 31	9.2		61 11	7.9	6 47	80	47 8 2 1 52 8	8.6		32 9.1		50 41	2.0		44 15 10 1	4 ;	24 10.5 34	34 51 11.3	
30 15 45	7.4	11 44	1.7.7	7.7 7.23		6.2	2 41	8.3	$\frac{2}{57 \ 35}$	8.7		52 0 91 45 57	4	. 22	0.7		30 12 10 3	3,			0
4	7.4	7 54 7.7 3 25 8.0	7.7	m	25 8		2 58 32	8.4	53 14	8.8	47	26 9.	2 41	2 2	8.6	34	3 10.6	26		23 24 12.0	0.4

DECLINATION 4 N

i. N.		40		4	41		45		4	43		44		45	10	4	46		47		\$	~		4 9		•••	20
ALT.	H.	1	a.	H.A.	D.		H.A.	D.	H.A.	D.	H.A	. D.		H.A.	G.	H.A.	G.		H.A. D.		H1.	G.	H.A.		G.	H.A.	. D
30 0	33 m	\$ 94	5.7	3h m s 31 34	s 8.5	= "	3h 29 13	5.9	3h m s 26 42	s s	£ # 42	h s o	s nr	3h 21 10	s 6.4	3h 18	s s 6 6.6	tg " 4	0.0	s n	3h m s 11 18	s 7.1	3h m s 7 3		s 7.3	3h 3 2	s s 26 7.6
30 30		57		28 40			5 15		23 40	40 6.1	20	54 6	6.3	17 57	6.4	14 48	8 6.7	=	25 6	6.9	7 47	7.1	···	52	7.4	2 59 4	49 7.6
31 0	28	9	5.7	25 46	46 5.8	23	3 16	0.9	20 37	7 6.2	17	46 6	6.3	14 44	6.5	11 29	6 6.7	^	59 6	6.9	4 14	7.2	° '	-	7.5	55 4	49 7.7
31 30	25	15	5.7	2 51	1 5.9	20	21.0	6.0	17 3.	33 6.2	14	37 6	6.3	11 29	9.9	00	8 6.8	4	31	7.0	0 39	7.3	56	82	9.2	51 5	57 7.8
32 0	22	23	5.8	19 5	55 5-9	17	91 2	6.1	14 2	27 6.2	11	⁻ 92	6.4	8 13	9.9	4 45	5 6.8	- '	2	7.1	57 2	7.4	52	-2+	7.7	48	1 7.9
32 30	61	30	5.8	16 58	58 5.9	9 14	4 15	9.1	11 2	21 6.3	00	14 6	6.4	4 55	6.7		1 6.9	57	30	7.2	53 22	7.5	48	54	7.8	4	2 8.1
33 0	91	37	5.8	14	0.9 0		1 12	6.1	× ×	13, 6.3	5 1		6.5	1 35	6.7	57	54 7.0	53	57 7	7.3	49 40	9.2	45	7	6.2	40	0 8.2
33 0	13	42	5. 8.	11	1 6.0		oc oc	6.2	'n	4 6.3	- '	9	6.5	58 14	8.9	54	26 7.0	50	20 7	7.4	45 55	7.7	41	7	8.0	35	54 8.3
34 0	9	47	5.9	00	0.9		5	6.2	1 53	3 6.4	5.00	0	9.9	54 51	8.9	50	56 7.1	46	42 7	7.5	42 7	7.8	37	6	8.1	31 4	44 8.4

DECLINATION 4 N

	Lat. N. 50 51	00			51			52		яO	53		54	₹#		55			56			57	-	58			59
	Н.А. D.	-	D.	H.A		H.A. D. H.A. D.	H.A		<u>.</u>	H.A. D.	D.	I	.A.	H.A. D.		H.A.	D.		H.A. D.	i d	H.A	H.A. D.	5	H.A. D.	D.	,	H.A. D.
	24 0 46 16 6.9 43 21 7.1 40 14 7.3 36 52 7.6 33 15 7.8	9 9	s 5.9	3h m 43	21.7	s .	3h m 40 1	s 4	3 %	3h s 36 55	7.6	, E &	3h 3 15	s 7.8	3h 3h 3h 29 21 8.1 25 8 8.5	h s 21	s 8.	3h s	00 00	υ 1.6° (γ) από	3h s s	, oc	E E 3	3h s s	8 0	3h	8 9
	30 42 50	9 05	6.9	39 49	- 64		36	35 7	4	7.1 36 35 7.4 33 6 7.6 29 21 7.9	7.6	- 50	21	7.9	25	25 18	8.3	20 55	55 8	8.6	91	9 9.0	0 0	10 56	9.5		5 14 10.0
0	39 24	4 7	7.0	36 16	. 91	7.2 32	32 5	55 7	4	55 7.4 29 19	7.7	- 2	25	7.7 25 25 8.0	21	21 12	8.3 16 39 8.7	91	39 8		11 41	1.6		6 15	9.6	0 18	18 10.2
30	35 55		7.0	32 4	41 7	7.2	29 I	3. 7	ż	25 29	7.8	21	26	8.1	29 13, 7.5 25 29 7.8 21 26 8.1 17 4	4	8.4 12 19 8.8	12	8 61		7 9	9.5	**	1 29 9	8.6	55	55 15 10.3
0	32 26	9	7.1	29 5 7.3	5 7	3	25 2	29 7	7.6	21 37	7.9	17	25	7.9 17 25 8.2	12 53	53	8.5 7.57 8.9	7	8 4		2 33 9.4	9.6		56 39	6.6	0	9 10.6
30	28 55 7	5 7	-	7.1 25 27 7.4 21 43 7.6	7 7	4	21 4			17 42	7.9	13	13 21	s. 3		8 38 8	8.6	3 30 9.1	6 0	-	2 57 54 9.6	9.6		44 10.1	0.1	4	55 10.8
0	25 22	22 7.2	.2	21 4	47 7.	7.4 17 55	17 5	5 7	7.7	13 45	8.0		9 15	8.4	4	4 21 8	8.8	2 59 o	6 0	9.5	53 9 9.8	8.6	46	43 10.4	5.4	39 3	34 11.1
	21 48	20	7.2	19 5 7.5 14 5 7.7	5 7	r.	14	5 7.	7	9 46	8.0 5 5	5	S	8.5		0 0	8.9	54 26	6 9	9.3	48 19	19 10.0	41	41 35 10.6		34 611.4	6 11.
	0 18 11	7	7.3	14 2	7	Ŋ	10 1	3 7.	00	14 21 7.5 10 13 7.8 5 44 8.1 0 52 8.6	8.1	0	52.	8.6	55 34		0.6	49 47		9.4	43 24	10.1	24 10.1 36	21 10.8 28	00		20 11.6

DECLINATION 5 N

at. N.	4.	40		4	_	14	45		4	43		+	-2-	44 45 46	45		4,	9		4	2		47 48			67		20
ALT.		H.A. D.		н.а. D.	D.		Н.А. D.		H.A. D.	D.	Ξ	+	H.A. D.		H.A. D.	D.	H.A. D.	-		H.A.	H.A. D.		H.A. D.	D.	H.A. D.	D.		H.A. D.
30 0	3h s s s s 37 42 5.6	s 5	9.	3h s 35 4c	s.7.5	3h 3h s m s s 35 40 5.7 33 29 5.8	s 29 5	, ∞	3h 31 10	s 6.0	, E 32	h s	s 6.1	3h 26	w =	5	3h m 23 I	9 1		3h 20 10	6.7	E I	3h 57	5	3h 3	s 7.1	3h m s s	2 2
30 30	34 5	54 5		32 48	3.7	32 48 5.7 30 34 5.9 28 10 6.0 25 37 6.2 22 52 6.3 19 56 6.5 16 49 6.7 13 30 6.9 9 54 7.2	34 5	6:6	28 10	9.6	2,	37	6.2	22	52 (6.3	19 5	9 9	Š	16 4	9 6.7	- 1	30	6.9	9 55	7.2		1 7.5
31 0	32	6 5	5.6	29 5t	5.8	29 56 5.8 27 38 5.9 25 10 6.1 22 31 6.2 19 42 6.4 16 41 6.6 13 28 6.8 10 2 7.0 6 18 7.3	38 5	6.9	25 10	6.1	23	31	6.2	61	42 (6.4	16 4	9 11	9.	13 2	8 6.8	3 IC	2	7.0	91 9	7.3	2 17	7 7.5
31 30	29	16 5	9.6	27 3	3.5	3 5.8 24 41	41 5	5.9	22 8 6.1 19 25	3 6.1	ì	25	6.2	6.2 16 31 6.4 13 24 6.6	31 (6.4	13 2	4 6	9.	01	3.9 1	8	32	7.1	10 4 6.8 6 32 7.1 2 40 7.3	7.3	58 0 7.6	0 7.
32 0	26	27 6	6.7	24 10	5.8	3 21 43		0.9) 61	6.1	1(81 9	6.3	19 6 6.1 16 18 6.3 13 18	18	6.5	6.5 10 5 6.7	5 6	7	6 30	9.6	(*)	6 39 6.9 3 0 7.2	7.2	2 59 o	7.4	54 42	2 7.7
32 30	23 36	36 6	6.7	21 15	5.8	21 15 5.8 18 44 6.0 16 3 6.2 13 9 6.3 10 4 6.5 6 45 6.7	44 6	0.0	91	3 6.2	Ξ,	6	6.3	10	4	6.5	6 4	5 6	1.	3 1	3 7.0	. 55	3 13 7.0 59 25	7.2	55 18	7.5	50 50	0 7.8
33 0	20	45 6	6.7	18 20	5.6	5.9 15 45 6.0 12 58 6.2 10 0 6.4 6 48 6.6 3 23 6.8	45 6	0.0	12 58	3 6.2)I	0	6.4	9	48 (9.9	3 2	3 6.		2 59 44	1 7.c	. 53	7.0 55 49	7.3	51 33	7.6	46	56 7.9
33 30	17	53 6	8.9	15 24	5.6	5.9 12 44 6.1 9 52 6.2 6 48 6.4 3 31 6.6 0 0 6.8	44 6). I	9 5%	6.5	•	48	6.4	5	31 (9.9	0	0 6		26 1	3 7.1	52	01	7.4	56 13 7.1 52 10 7.4 47 45 7.7	7.7	42 58	8 8.0
34 0	15	9 0	8.9	12 26		5.9 9 42 6.1	42 6	1.0	6 4	6.3	(.,)	36	6.5	6 45 6.3 3 36 6.5 0 13 6.7	13 (2.9	56 34	4		52 40	7.1	4	3 29	7.4	52 40 7.1 48 29 7.4 43 55	7.7	38 56 8.1	8 9

DECLINATION 5 N

02	HAT DIEVE	1	9.0 18 42 9.4	0.60	7.6 6.	8.3 15 30 8.6 10 44 00 5 2 3 9.9	27 10.0	54 27 10.2	20 10.4	58 4 9.1 52 16 9.6 45 53 10.2 38 48 10.8
	***	E .	~		,	†	. 5		46	± ∞
20	_ =	×.	9.0	0		† ;	9.5	7.6	9.8	0.0
	=	3h 3	8.7 10 11	25 0 44 58 6.8 42 0 7.0 39 1 7.2 35 42 7.5 32 8 7.8 28 17 8.1 29 7 84 19 35 8.8 14 38	, 0		17.5	2 3/	55 47	50 55 10.0 44 45 53 10.2 38
57	3		8.7	8.8	0.0		2			9.6
	-	- / :	3 15	3 15		-	‡ =	5	5	52 16 9.6
	=	_ E = 3	3 5	. 61	1.5	, 5	9	-	. 7	52
55 56	Ξ.	v ×	8.3	8.4	30	8.6	8.7	8.0	0.0	9.1
5.0	-	. 45° 5°	1 1	7	54	30	20	0,0	5 ::	3 4
	-	ີ = ?	82	29	19	-	, =	9		38
	<u></u>	7.0%	8.0	8.1	8.2	8	× 50	> 20 10	8.6	8.7
10		3h s	17	17	24 15	10	6	52	30	21
	=			28	- 57		91	=	1	
5.1		x 1.	7:7	7.8	7.9	7.9	8.0	×.	8.2	\$ 3
τĊ	1	3h 5 9 49	0 9	. S	\$ 15	6I ‡	21	7.8 16 21 8.1 11 52 8.5 6 50 8.0 1 30	81	12
		. = +			- 2		ži	1		
53	_ =	× 1.	7.	7	1.	7.6	7.7	7.8	7.9	7.9
13	AUT. HAA D.		42 37 7.2 39 26 7.5 36 0 7.7 32 17 8.0 28 17 8.3 23 55	35 42	7.1 35 24 7.3 31 57 7.6 28 15	26 0 38 6 6.9 35 2 7.1 31 44 7.4 28 10 7.6 24 19 7.9 20 10 8.3 15 39 8.6	7.4 24 21 7.7 20 21 8.0 16 2 8.3 11 20 8.7 6 1.	7.0 27 52 7.2 24 19 7.5 20 29	40 7.1 24 15 7.3 20 34 7.6 16 36 7.9 12 18 8.2 7 38 8.6 2 33 9.0	7.3 16 47 7.6 12 40 7.9 8 12 8.3 3 21 8.7
5.5	·		.5	5	÷	4	7	- 10		9
66		's 2	37 7	-	177	4 7	2 7	6	- '-	7 7.
	=	3h m 46	7	39	35	31 4	28	77 1	20 3	16 4
	<u></u>	x 7.0	24 30 48 21 6.8 45 35 7.0	0.2	7:1	7.1	7.2 28 2	7.5	.5.	7.3
i c	-	~ 4	35	٥	35	-2	28	52	15	36
	= -	E # 64	45	42	38	35	31	27	7	20
Lat. N. 50 51	<u> </u>	3h 51 44 6.8	6.8	6.8	6.9 38 35	6.9	26 30 34 39 7.0 31 28	7.0	7.1	28 0 24 8 7.1 20 36
50	-	~ x 4_	21	58	41 33	9	39	0	_ ot	00
	=	m 51	48	4	7	38	75	27 0 31 10	17	24
Z	E.	. 0	30	0	30	0	30	0	30	0
2	7	24	24	25	25	26	26	27	27	28

DECLINATION 6 N

50	H.A. D.	3h 3h 3h 5 m 5 5 m 5 5 19 13 7.0 15 45 7.2	12 8 7.3	8 30 7.4	4 49 7.4	1 6 7.5	57 21 7.6	53 33 7.7	49 43 7.8	45 49 7.9
6;	<u>.</u>	7.0	7:1	2.1	1.2	7.3	7.7	7.4		9.2
6.7	111.	3h m 5 19 13	15.43	12 12	8 39	10	1 28	65 46	54 7 7.5	50 23
		× 8.	8.9	6.9	6.9	7.0	7.1	7.1		7.2
\$	H.A. D.	s m s s 1 6.6 22 26 6.8	19 3	15 39	12 13	\$ 45	5 16	1 45	6.9 58 11 7.2	7.0 54 36
	D.	s 6.6	6.6	6.7	2.9	8.9	8.9	6.9	6.9	7.0
14	II.A. D.	3h m s 25 26	6.4 22 9 6.6 19 3 6.8	18 31	15 31	12 10	St 8	5 23	5 27 6.7 1 57	58 30
	<u>:</u>	s. 6.4	6.4	6.5	6.5	9.9	6.6	6.7	0.7	8.9
9	н.л. р.	3h 3	25 2	12 6.1 24 36 6.3 21 49 6.5 18 51 6.7 15 39	6.0 24 8 6.2 21 28 6.3 18 36 6.5 15 31 6.7 12 13	15 21	12 +	s 47	5 27	2 6 6.8
		6.2	6.2	6.3	6.3	6.4	† ·9	6.5	6.5	9.9
45	Н.Л. D.	3h m s 30 50	27 43	24 36	21 28	18 18	6.2 15 7	6.3 11 56	44 6.3 8 42	5 28
‡	Ξ.	0.1	0.1	0.1	6.2	6.2	6.2	6.3	6.3	6.3
#	H.A. D.	3h m 5 33 16	5.9 30 14	27 12	24 S	5.8 . 26 3 5.9 23 38 6.0 21 4 6.2 18 18	17.58	5.2	#=	6.0 11 29 6.1 8 35 6.3 5 28 6.6
	<u>.</u>	6.6	5.0	0.0	0.0	6.0	6.0 17	6.1 14	6.1	6.1
<u>₹</u>	H.A. D.	3h 35 32	32 35	29 37	35	23 38	20 37	30	14 34	11 29
		200	3.5	×.5	5.9 26	5.9	5.9	5.9	0.9	0.0
64	H.A. D.	3h 17 40	34 47	31 53	28 58	6 3	3 6	20 9	11 11	14 12
		. × 7.	5.7 3	5.7 3	5.7 2	8.5	5.8	.8	5.8	5.8
-	н.л. г. р.	3h s s s 39 40 5.7	_	0	31 9 5	28 18	25 25 5.8 23 6 5.9 20	22 32 5.8	19 39	16 44
		. e	9:	5.6 3	5.6 3	5.6	5.7	5.7	5.7	5.7
0+	ALT. H.A. D.	h	16 5	59 5	12	24	36	94	57	19 6 5
	Ξ	. a .	38	35	33	30	27			61
Lat. N. 40	ALT.	3h s m s s m s 3o 4c 3o 4c 3o 4c	30 30	31 0	31 30	32 0	32 30	33 0		34 0

DECLINATION 6 N

	Lat. N. 50	55		5.0	22	53 54 55 56	75		50			99	1	57		25	2		0
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DECLINATION 9 N

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DECLINATION 9 N

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DECLINATION 9 N

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DECLINATION 10 N

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DECLINATION 10 N

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DECLINATION 11 N

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DECLINATION 12 N

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DECLINATION 13 N

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DECLINATION 14 N

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DECLINATION 14 N

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56	<u></u>	v 17	7.5	7.5	9.2	9.2	9.2	7.7	7.7	1.8	7.8	7 9	8.0	8.0
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DECLINATION 15 N

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DECLINATION 15 N

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0	57 18	6.4	55 3	8 6.6	5 53	50	8.9	51 52	7.0	46 4	3 7.5	4	7 22	+:	#	18 7	9.	12 0	7.9	38 50	5 8.2	35 34 8.6	#
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0	50 51.	6.5	65	2 6.7	47	5	6.8	44 53	7.1	42 3	7-3	3,5	9 56	7.5	37	7 7	∞,	17	8.0	30 40	8.4	26 57	
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DECLINATION 16 N

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36 30	41		5.3	40 49	19 5.	7	39 45	5.31	38	34	9.5	37 I	6 5	7 3	5 5c	5.9	34	17	6.0	32	34 6.		0 42	6.3	28 41	9	6.5 26 28	28	6.7
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37 30	36		5.3	35 25	35.	+	5.4 34 14	10	5.5 32 57	57	2.7	5.7 31 31 5.8	1 5.	× ×	29 58	5.9	5.9 28 16	91	6.0 26 25 6.2 24 24 6.4	26 2	35 6.	2	1 24	6.4	22 II	6.5	, 5	10.47	, ,
38 0	33	49 3	5.3	32 42	5.	+	11 28	5.5	5-4 31 28 5-5 30 7 5-7 28 39 5-8	7	1.7	28 30	5.5		7	27 1 5.9 25 15	25	5	6.1	23 I	23 19 6.2 21 13	2	1 3	. 6.4	× 2	. 6	4	7	
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39 0	28	29 5	4	27 1	27 16 5 5 25 55	5 2	5 55	5.6	5.6 24	27 5	1.	22 51	5.8	2 2	9 1	27 5.7 22 51 5.8 21 6 6.0 19 11 6.1	19	-		17	17 6 6.3		40	6.4		9.9		, x	
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DECLINATION 16 N

29	H.A. D.	3h	m s s s 59 28 5.2	55 22 8.2	51 15 8.3	47 6 8.4	42 55 8.4	38 43 8.5	34 29 8.5	30 13 8.6	25 54 8.7	21 33 8.8	17 10 8.9	12 43 9.0	
58	Н.Л. D.	1	m × × m 1 53 7.9	57 56 8.0	53 57 8.0	49 57 8.0	45 56 8.1	41 53 8.2	37 48 8.2	33 42 8.3	29 33 8.3 25	25 23 8.4	21 10 8.5	16 55 8.6	
57	И.Л. D.		m s s t 4 5 7.6	0 16 7.7	56 25 7.7	52 33 7.8	48 40 7.8 45	44 46 7.9	40 49 7.9 37	36 52 8.0 33	32 53 8.0 29	28 52 8.1	24 49 8.2	20 44 8.2	
99	H.A. D.		s 7.4	2 23 7.4	7.2 58 40 7.5	7.3 54 55 7.5	7.3 51 9 7.5	47 23 7.6	43 35 7.7	39 45 7.7	35 55 7.8	7.5 32 2 7.8	7.6 28 8 7.8	24 13 7.9	
55	H.A. D.	:	m > > 7	4 19 7.2	0 42 7.2	57 5 7.3	53 25 7.3	49 46 7.3 47	46 6 7.4	42 24 7.4	38 41 7.5 35	34 56 7.5	31 10 7.6	27 23 7.6	
10	H.A. D.		6.8 9 35 7.0	6 5 7.0	2 34 7.0	6.9 59 3 7.1	55 31 7.1	51 57 7.1	48 23 7.2	44 48 7.2	41 12 7.2	37 35 7.3	33 56 7.3	30 17 7.4	
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50	H.A. D.	4h	, m s s o 14 51 6.3	11 +11 6.3	8 31 6.3	5 21 6.4	2 10 6.4	58 58 6.4	55 46 6.4	52 34 6.5	49 20 6.5	46 6 6.5	42 52 6.5	39 37 6.5	
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DECLINATION 17 N

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36 30	45	2 5.3	3 . 4	4 13	5.4	43	18	5.5	42	17	9.6	41	6	2.7	39	. 5	 	38	32	6.5	37	. I	: -	5 5	6 6	3 50	‡ ::	7 -	6.4 34 51	1 6.5
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37 30	39	45, 5-3	3 38	S 51	5.4	5.4 37 50, 5.5	50	10	36	42	36 42 5.6 35 27	35 2	:7 5	7-7	7	i.c	- 20:	32	35 (0.0	30	5.7 34 5 5.8 32 35 6.0 30 56 6.1 29 7		6	9	6.3 27 0 65 24 50	_ 0	2 9		
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38 30	34	27 5.3	-	3 27.	4.5	32	20	iń	5.4 : 32 20 5.5 31 0 5.0 29 44; 5.8 28 14	9	9.	29 4	14	×	200	14 5	5.6	26 35	55 6	0.0	24 48	8.		5 5	9	6.2 22 50 6.3 20 11 6.5 18	20 11	ς · ·	21 40	
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DECLINATION 17 N

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5	-	- x	4	1 20	13	57	40	23	5	47	27
		- E	u-)	e) -	. 59	6.4 55 57	6.4 52	6.4 , 49	6.4 46 5	- 5	35
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DECLINATION IS N

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0	29 45	5.3	28 45	Si Çı	5.4 2	27 38	5.5 26	26 2	24 5.0	6 2	2	5.7	5.6 25 2 5.7 23 32		5.9 21	53	6.0	20 4	4 6.1	1	18 4 6.3 15 54	6.3	15	4 6.		30	

DECLINATION 18 N

59	. C.	× 01	13 8.1	9 8.1	5 8.2	58 8.3	50 8.3	41 8.4	30 8.4	17, 8.5	1 8.7	41 8.7
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58	H.A.	44 m s m 7 I I I I I	3 24	3 59 29	55 33	51 35	6 7.8 47 36 8.0	43 35	7.8 39 33	35 30	31 24	27 17
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25	D. H.A.	th s m	5 23	7.4 1 35	57 47	53 5	50	46 13	42 20	38 25	34 29	30 31
	Ξ.	z. 7:3	+	7-4	7.4	7.5	7.5	7.5	9.2	9.2	7.7	7.7
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5 4		20		19			53	5.5	17	46 5.6	91 9	32	5.7	15	6 5.6	9 13	3 36	0.9	11	53 6.	1 1.9	0 01	6.3	7 55		6.5	5 36	
4		81	5.3	17			00	5.5	14	58 5.6	13	-04	5.7	12 1	13 5.9	01 6	36	6.0	%	49 6.	1.9	6 51	6.3	4	40 6.	6.5	2 15	6.7

DECLINATION 21 N

ES.		20		51	_		52		*(3)	53		54			55	<u> </u>	56	-		57	-	85			0 20	
ALT.	H.A.	. D.	!	H.A.	D.	H.A.		D.	H.A.	D.	H.A.	+	D.	H.A.	D	-i-	HA	2	I	,		5	. 6	;	5 -	
	3h			34		45			de de		7	Ī				-						F. 1. 3.	i	H.A.		Ġ.
30 0	m 31	s s 43 6.2	3	s 1 25	s 6.4	31	× -	s 6.5	m 30 35	s s 32 6.7	3h m 7 29 5	S 85	s 6.8	3h m 29 I	18 s	s m s	3h s 21	2 8	m 3h	00	S Z	3h m s	on '	. 3h	un'	on.
30 30	28	36 6.2	2 28	8 13	6.4	27	. 5	6.5	27 12	6.7			000				,		7							6.
0	25 29	9 6.2	2 25	2	6.4	24		6.5			-	2	0 7					7.2	23	55 7.	7.4 2	22 47	7.7	21	30 7	7.9
30	22	6.9		t.				2			23	_	ο. Χ	22 I.	17 7.1	1 21	- N	7.2	20	12 7.	7.4	18 57	7.7	17	33 7.	6.2
5			-			21	4	0.5	20 31	6.7	19	42	6.9	18 45	5 7.1	17	41	7.2	91	29 7.5	5 15	10	7.7	13	36	8.0
0	19 15		3 18	39	4.9	17	28	6.5	17 10	6.7	91	91	6.9	15 14	1 7.1	14	4	7.3	12 4	45 7.5		-	1			O
30	2 91	6.3	15	28	6.4	14	45 (9.9	13 49	6.7	12	49 (6.9	11 42			26	7.3								0
0	13 0	6.3	12	91	6.4	11	25 6	9.9	10 28	6.7	6	22 (6.9	8			47	7.3	, v			5	0, 0	ς		0
30	9 52	6.3	6	3	6.4	00	-8-	9.9	9 2	6.8	'n	55 6	6.9	4 36			- 00	7.3	1 2		2 2	30 2	0 ×		0.0	0 .
0	6 44	6.3	rU.	51	6.4	4	51 6	9.9	3 43	6.8	7	27. 6	6.9	1 2	7.1	2 65	00		57 4			, r		3/ 30		-

DECLINATION 21 N

	<u>u</u>		on (×.	8.4	8.5		8.6	8.7	00	00 00	8.9
59	- I	_		II	61	51	37	22	2	45	22	57
	H.A.	2h	Е	37	33	28	24	20	91	11	7	7
	Ö.		us.	8.0	8.1	8.1	8.2	8.2	8.3	8 4	35.	8.5
200	H.A.	_		56	99	54	50	45	38	29	18	4
	Ξ	2h	ш	39	35	31	27	23	19	15	11	7
	н.А. D.		s.	7.7	7.8	7.8	7.9	7.9	8.0	8.0	8.1	8.1
57	+	_	US.	6.4	33	40	45	49	51	51	20	47
	H.	2h	Ξ	0	38	34	30	26	22	18	14	10
	D.		se	7.5	7.5	9.2	9.2	9.2	7.7	7.8	7.8	7.8
56			ur;	39	55	0	23	35	46	55	6	× .
	H.A.	2h:		4	40	37	33	29	25	21	18	14
1	H.A. D.		sc	7.3	7.3	7.3	7.3	7.4	7.4	7.5	7.5	7.5
55	٠	_	'n	41	3	25	45	ιń	23	40	99	Ξ
	Н. А	2h		46	43	39	35	32	28	24	20	17
	H.A. D.		sc	7.0	7.1	7.1	7.1	7.2	7.2	7.2	7.3	7.3
54		<u> </u>	ur,	30	59	27	55	21	46	Ξ	34	56
	H	2h	E	48	44	41	37	34	30	27	23	19
	D.		x	6.9	6.9	6.9	69	7.0	7.0	7.0	7.0	7.0
55	H.A. D.		v.	6	43	18	51	2.4	55	26	56	25
	H	2h	Ξ	50	46	43	39	36	32	29	25	22
	D.		v.	6.7	6.7	6.7	6.7	6.7	8.9	8.9	8 9	8.9
52			ur.	37	8	57	36	15	53	30	9	41
	Н.	2h		51	48	4	41	38	34	31	28	24
	D.		uc	6.5	6.5	6.5	6.5	9.9	9.9	9.9	9.9	9.9
51	4			57	42	27	Ξ	55	300	21	01	43
	H.A.	2h	=	52	49	46	43	39	36	33	30	26
	D.			6.3	6.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4
50			,	, 00	58	94	37	26	14	-	84	35
	ALT. H.A.	1 46	į (54 8	50	47	44	41	38	35	31	28
Lat. N.	1			Ö	30	0	30	0	30	0	30	0
=	AL			36	36	37	37	38	38	39	39	40

DECLINATION 22 N

Z	Lat. N.	40		4	41		45			43		+	++			45		46		4	47		48		64	-	4.	50
4	H.A.	A.	D.	H.A. D.	D). H.A. 1	À.	<u></u>	H.A	H.A. D. H.A. D.		I.A.	<u></u>	H	Ä	D.	H.A. D. H.A.	. D.	=	7	H.A. D.	H.A	H.A. D.	-	H.A. D.	6	S H	=
. 0	3h s s 40 o 42 7 5.2	, s		3h 3h 3h 3h 3h 3h 3h 3h 3h 3h 3h 3h 3h 3	« 4	m 3 41	h 15	s 5.4	3h m 40 4	s 5.	- E 4	3h s	s 5.6	3 m 39	h s 13	s 5.7	3h 13h 38 1	8 x	8 E	3h s 7 17	s 6.0	3h 36 36 36	s s 5	m 3	s s		3h s	2 0
30	39	30	5.5	39 4	4 5.	39 4 5.3 38 33	33	5.4 37 11	37	11 5.	6 3	7 11	5.6	36	21	5.7	35 2	 	9 3	4 18	6.0	33	4 6.	1 31	31 41	6.3	33 22	4.0
0	36	53	5.2	36 25 5-3 35 50 5-4 34 23 5-6 34 23 5-6	5 5.	3 35	50	5.4	34 2	3 5.	6 3	1 23	5.6	33	29	5.7	32 2	7 5.0	9 3	81 1	6.0	5.6 34 23 5.6 33 29 5.7 32 27 5.9 31 18 6.0 30 0 6.1 28 33	0 6.	28			26 56	1 9
30	35	91	5.5	33 45 5.3 33 8 5.4 31 34 5.6 31 34 5.6	5 5.	3 33	∞	5.4	31 3	5.4	5 3.	34	5.6	30 37	37	8.5	5.8 29 31	I 5.0	32	8 18	5.9 28 18 6.0 26	26 5	6 6.2	56 6.2 25 24 6.3	24		22 42	
0	31	38	5.5	31 5 5.3 30 25	5.5	3 30	25	5.4	28 4	5.5.	5 28	3 45	5.6	27	4	8.5	5.4 28 45 5.6 28 45 5.6 27 44 5.8 26 35	5 5.9	5.9 25 18	.81	6.0	6.0 23 51 6.2 22 15	1 6.2	22			20.08	6 2
30	29	-	5.2	28 25 5	5 5.4	1 27	27 42 5	5.4 25 55	25 5	5 5.6	25.	55	5.6	24	51	\$.5	5.6 25 55 5.6 24 51 5.8 23 38	8 5.9	22	17	6.0	5.9 22 17 6.0 20 46	6.2	9	01		1 2	
0	26	23	5.2	25 44	5.4	1 24	24 59 5	5.5 23 6	23	6 5.7		9	5.7	21	58 5	8	5.7 23 6 5.7 21 58 5.8 20 41	5.6	61 (91	6.0	5.9 19 16 6.0 17 40 6.2	0.2		2 2		7, 17	6.5
30	23	94	5-3	23 4 5.4 22 15 5.5 20 16	5.4	22	15 5	10	20 I	6 5.7	5.7 20 16	91	5.7	19	4	00	19 4 5.8 17 44	9 1	, 16	14	6.1	6.0 16 14 6.1 14 33 6.2	6.2	12	4 2		13 30	0.0
0	21	00	5.3	20 23	5.4	5.4 19 31 5.5 17 25 5.7 17 25	31 5	5:5	17 2	5 5.7	71 . 17	25	5.7	91	10 5	00	5.7 16 10 5.8 14 45	9.0	13	11	6.1	6.0 13 11 6.1 11 26 6.2 9 30	6.2	6	30		7 21 6.6	9.9

DECLINATION 22 N

_	D.	90	8.2	8.2	8.3	8.3	8.4	8.5	8.6	8.7	8.8
59	H.A.	ч	s 12	9	59	50	40	27	13	26	36
	Ħ	3h	E 4	9	35	31	27	23	61	14	01
	D.		s 7.9	7.9	8.0	8.0	8.1	8.2	8.2	8.3	8.4
200	4		36	39	41	41	40	37	32	56	17
1	H	3	m 46 €	42	38	34	30	26	22	18	14
	D.		s 7.6	7.7	7.7	7.8	7.8	7.9	7.9	8.0	8.0
57	H.A.		s 46	57	9	15	22	28	32	35	36
	Ξ	3h	H 48	4	41	37	33	29	25	21	17
	H.A. D.		s 7.4	7.4	7.5	7.5	7.5	9.2	9.2	7.7	7.7
96		_	s 45	0	17	3.3	84	63	15	56	36
	Ξ	3	m 50 4	47	43	39	35	32	28	24	20
	Ξ.		7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.4	7.4
55	H.A. D.	-	27	52	91	39	H	22	42	27 1	18
	Ξ	34	m 55	48	45	41	38	34	33	27	23 18
	D.		s 7.0	7.0	7.0	7.0	7.1	7.1	7.1	7.2	7.2
54		_	's =	32	2	31	40 0	28	54	20	45
	H	3h	m 54 I	50	47	43	40	36	32	29	25
	D.		s 6.8	8.9	6.8	8.9	6.9	6.9	6.9	7.0	7.0 25
533	+	- u	s 26	-	37	12	41 47	21	54	26	57
	Ξ	3h	m 55	52	48	45		38	34	31	27
	D.	1	s 6.6	9.9	6.7	6.7	6.7	6.7	6.7	6.8	8 9
52	i	l 4	s C+	21	3	43	23	3	42	20	57
	Ξ	3h	m s 56 40	53	50	46	43	40	36	33	29
	D.		s 6.4	6.5	6.5	6.5	6.5	9.9	9.9	9.9	9.9
51	ب	4	s 46	33	19	4	50	35	8	2	45
	H.A.	3h	m 57	54	51	48	44	41	38	35	31
	D.		s 6.3	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.4
50	H.A.	-	v 4	36	27	17	^	56	46	34	22
	Ξ	3h	38 m	55	52	49	46	42	39	36	33
Lat, N	1		. 0	30	0	30	0	30	0	30	0
at.	ALT.	1	36	36	37	37	38	38	39	39	40

DECLINATION 23 N

at. N.	7	9		41		4	43	•	43		44	44		45	45		97	4	47	-	8		4	49		50
M.T.	H.A.	Ö.	H.	H.A. D.	Ξ.	H.A.	D.		H.A. D.		H.A. D.	D.	H.A	H.A. D.		H.A.	D	H.A. D. H.A. D.	D.	H	Ą	Ü.	H.A.	H.A. D.		H.A. D.
° 40° ′	3h s 45 3	3. S.	3h m s 44 48	. 84 . 5	° 20	3h s 44 29; 5	× 4	3h s s	s 4	E 4.	3h m s 43 33	N L	3h 42	3h s s 6 42 56 5.7	m 7 42	3h m s 42 12	s so	3h m s 41 22	s 6.0	m 9	3h s s 40 24 6.1		3h s 39 r8	\$ 6.2		S S S
40 30	30 42 26	6 5.2	42 9		5.3	41 47	5.4	61 19	19 5.	5.5 40 45	45	Ė	40	40 5 5.7	7 39	39 18	8:	38 23	6.0	37 22	22		36 12	6.2		53 6.4
41 0	39 49	9 5.2	39	30 5	5.3	39 5	5 5.4	38	34 5.	5.5 37	57		37 1	14 5.	5.6 37 14 5.7 36 23	23	5.8	35 25	0.9	34	61	6.1	33 5		31	
41 30	37 1.	37 13 5.2	36	50 5	5.3	36 23	5.4	35	49 5.5	5 35	35 9	5.6	34 22	2 5.7	7 33	28	5.8	5.8 32 26	0.9	6.0 31 16	91				28	
42 0	34 36	6. 5.2	34	11 5	5.3	33 41	5.4		33 4 5.5	5 32	21	5.6	31 3	30 5.7	30	33	5.9	29 27	6.0	28	13 (26 49 6	6.3	2,	
42 30	31 58	5.2	31	31 5.	5-3	30 58	5.4	33	5 18 5.5	5.5 29 32 5.6	32	5.6	28 38	38 5.7	7 27	37	5.9	26 27		25	6		23 41	6.3	22	2.0
43 0	29 21	5.5	28	52 5.	5.3	28 16	5.4	27	33 5 5	5 5 26	43	5.6	25 46	6 5.7	7 24 41		5.9	23 27			5		20 32			
43 30	26 44	5.2	26 12	2 5.	5.3	25 33	5.4	24	47 5.5	23	54	5.6	22 5	53 5.7	21 44		6 9	5 9 20 27		19	9 0		17 22			
0 4	24	7 5.2		23 32 5.3		22 5	5.4	22 I	1 5.5		21 5	5.6	20 0	0 5.7	18	48	5.9 17	17 26	6.0		54 6	.2		6.3		
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DECLINATION 23 N

	D.		s 8. I	8.1	8.2	8.2	8.3	8.3	8.4	8.4	8.5
59	H.A.	3h	m s 51 4	1 47 1	42 57	38 52	34 46	30 37	26 27	22 15	. 18 1
	D.		s 2.8	7.8	6.2	7.9	8.0	8.0	8.1	8.1	8.2
58	H.A.	3h	m s 53 9	49 14	45 19	41 22	37 24	. 33 25	29 24	25 22	21 18
	D.		s 2.6	9.2	9.2	7.7	7-7	7-7	7.8	6.2	6.2
22	H.A.	3h	s w 55 o	51 13	47 25	43 36	39 46	35 55	32 3	28 10	24 14
	D.		s 7.3	7.4	7.4	7.4	7.4	7.5	7.5	9.2	9.2
26	H.A. D. H.A. D.	3h	m s s 56 39 7·3	52 59	49 18	7.2 45 37	41 54	38 11	34 26	7.3 30 41	4
	J.		s 7.1	7.1	7.2	7.2	7.2 41	7.2	7.3	7.3	7.3 26
55	H.A.	3h	Ε	54 34	51 0	47 25	43 49	40 12	36 35	32 56	29 17
	<u>-</u>		s 6.9	7.0	7.0	0.2	7.0	7.0	7.1	7.1	7.1
54	H.A.	3h	s m s s 6.7 59 26 6.9	6.8 55 59 7.0	52 30	6.8 49 I	32	42 2	38 31	59	6.9 31 26 7.1
			6.7	8.9	8.9	8.9	6.8 45	8.9	6.9	6.9 34	6.9
53	H.A. D. H.A. D. H.A. D.	4h	s o 36	3 7 I4	53 51	50 28	4 4 4	43 39	40 14	36 48	38 4 6.3 36 40 6.5 35 7 6.7 33 22
	Ü.		s 6.6	3 20 6.6	9.9	9.9	9.9	6.7	6.7	6.7	6.7
52	[.A.	4h	s s m s s m 1 6.4 1 37 6.6	8 20	55 2	4	6.5 48 26	45 7	47	38 27	5 7
			ř 4	6.4 58	6.4 5	6.4 51	.5	6.5 4	6.5 41	6.5 3	3.
51	H.A. D.		s s	.9 81	5 6	52 6.	39 6		10 6.	55 6.	.9 ot
•		4h	E 2	3 59 18	56 5	52	49	46	43	39	36
	D.		s 6.3	6.3	6.3	6.3	6.3 49 39	6.3 46 25	6.3	6.3	6.3
50	H.A. D.	4h	6 3 17 6.3 2 31	0 9 6.3	57 1	53 52	0 50 43	47 34	44 24	41 14	4 8
×			, o	30	. 5	30 5	0_	30. 4	_0_	30 4	40 0 3
Lat. N.	ALT.		36	36	37	37	38	38	39	39	40

DECLINATION 24 N

1 _	. =	. v .							6.5	
50		3h s	30 30			.,				17 7
					6.2					-
49	-				24 6.			3 6.3		6.3
4	HA D	3h m s	4 04	37	34 2			25	N	18 47
~	0	8	0.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1 18
48	H.A. D.	s m s	41 34	38 33	35 31	32 29	29 26	26 23	23 20	20 16
		6	5.9	5.9	5.9	6.0				
47	-		24 5.				6.0	6.0	0.9	6.0
4.	H.A.	3h m	42 2	39 27	36 29	33 31	30 32	27 33	24 34	21 35
	D.	× 1.5		5.8	5.8	5.8	5.8	5.8	5.9	5.9
46	H.A. D.	3h m s 46 I	43 8	40 14	97 19	34 25	31 30	28 35	5 40	22 44
	<u>.</u>	s II S-7	5.7	5.7	5.7 37	5.7 34	5.7	5.7 2	5.7 25	5.7 2
45		3h m s 46 35	4	54	20	12	21 5	29 5	38 5	46 5
	H.A.	g # 94	43	40	38	35	32	29	26	23
4	H.A. D.	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6 23
44	H.A.	3h s s 147 2 5.6	44 14	41 27	38 39	35 52	33 4 5	30 16	27 27	24 39
	Ü.	s.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
43	H.A. D.	23 s	39	54	10	25	40	55	01	25. 5
		3h m s 47 23	4	5.4 41	39	36	33	30	28	25
43	D.	s 4.5	5.4		5.4	5.4	5.4	5.4	5.4	5.4
7	H.A. D.	3h m s 47 39	44 57	42 16	39 34	36 52	34 10	31 28	28 46	6 3
41		5.3	5.3	5.3	5.3	5.3	5.3	5-3 3	5.3 2	5.3 26
41	H.A. D.	Sos	01	31 5	52 5	13. 5	34 5	54 5	15 5	35. 5
	H	3h m s 47 50	45	42	39 5	37 1	34 3	31 5	29 I	26 3
0	D.	S. 2.	5.5	5.5	5.5	5.2	5.2	5.5	5.5	5.5
4	H.A.	3h m s 47 55	45 19	-	40 5	37 29	34 52		29 38	27 I
z	ALT.	.0	30		_	0	30			0
<u> </u>	Y	۰ 6	40	41	4	45	45			4

DECLINATION 24 N

	D.		v o		8.1	8.1	8.2	8.2	8.3	8.3	8.3
59	H.A.	3h	m s	53 49		45 45	41 42	37 37	33 31	29 23	25 14
28			s n			7.8	7.9	7.9	8.0	8.0	8.0
	-	1	v 4		84	55	59	"	9	7	7
	H.A. D.	3h	E 20 3	55 4		47 5	43 5	40	36	32	28
57	D.	1	0 1.		7.5	9.2	9.2	9.2	7.7	7.7	7.7
	H.A. D.	4	m r	3 57 22	53 36	49 50	46 2	43 14	8 25	34 34	30 42
			Ε						38		
99	D.		s 7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.5	7.5
	H.A.	2	m s	3.	55 12	33	52	11 44	29	46	61
	Ξ	4h	Ξ 2	58.	55	51	47	4	40	36	33
55	H.A. D.		s 7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2
	A.	_	s 5	0 11	38	10	31	56	21	4	7
	Ξ	4h	m s	9	56 3	53	49	7.0 45	42	38	35
54	D.		6.9	6.9	6.9	6.9	7.0		7.0	7.0	7.0
	Ą.	-	s 7	1 20	3 57 53	54 26	58	29	0	30	37 0
	H.A.	4	m s 4 47				50	47	4	40	
	H.A. D.		s 6.7	6.7	6.7	8.9	8.9	8.9	8.9	8.9	8.9
53	A.	4	m s 5 42	21	3 o 65	38	52 15	52	29	N	40
	Ë				59	55		48	45	42	38
52	D.		s 9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
	+i	_	31.	3 14	59 58	41	23	9	48	29	40 10
	H.A.	4h	m s 6 31	33	59	56	53	50	46	43	40
51	H.A. D.		s 6.4	6.4	6.4	6.4	6.4	6.4	6.5	6.5	6.5
	-	_	s 12	0 4	0 48	36	24	10	57	43	29
	H.	4h	m s			57 36	54	51	47	4	41
	H.A. D.		s 5.	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3 41
20	÷.	-	s 46	4 39	31	58 23	55 15	^	58	49	40
	H.	4h	, m s	4	н `	58	55	52	48	45	42
at. N.	ALT.		.0	30	0	30	0	30	0	30	0 4
	AL		36	36	37	37	38	38	39	39	40

BESSEL'S REFRACTIONS.

Alt.	Ref'n.	Alt.	Ref'n
		35	
		36	
		37	
		38	
28,	1 48.2	39	1 11.2
29	1 43.8	40	8.7
30	1 39.7	·····4I	і 6.3
31	1 35.8	42	1 4.0
32	1 32.1	43	1 1.8
33 · · · · · · ·	1 28.7	44	0 59.7
34			

The Parallax may be taken as 7" throughout.

ERRATA.

Page 5, line 16, for 25.3×5.4 read 25.3×4.5 11, Lat. 58, Alt. 27 30 for 21 58 read 21 15 12, "41, "33 30 "6 3 "6 30 50, " 30 30 " 59 49 " 59 39 50, " 27 30 " 21 40 " 21 48 " 16, " 40, " 32 to 34 for 6.7 read 5.7 6.8 5.8 6.7 " 26 30 for 54 16 read 56 16 26, 50, " 28 30 " 46 30 " 46 36 30, 53, 35, " 40 " 6 13 " 6 15 45, " 36 30 " 38 8 " 38 28 40, 42, " 54, " 31 30 to 32 30 for 7.0 read 7.1 " 42, " 38 30 for 35 33 read 35 53 45, " 44, " 36 35 " 40 43 " 48 43

